English

CODESYS

CODESYS® Engineering

Professional engineering of IEC 61131-3 automation projects

Application development solutions for various platforms

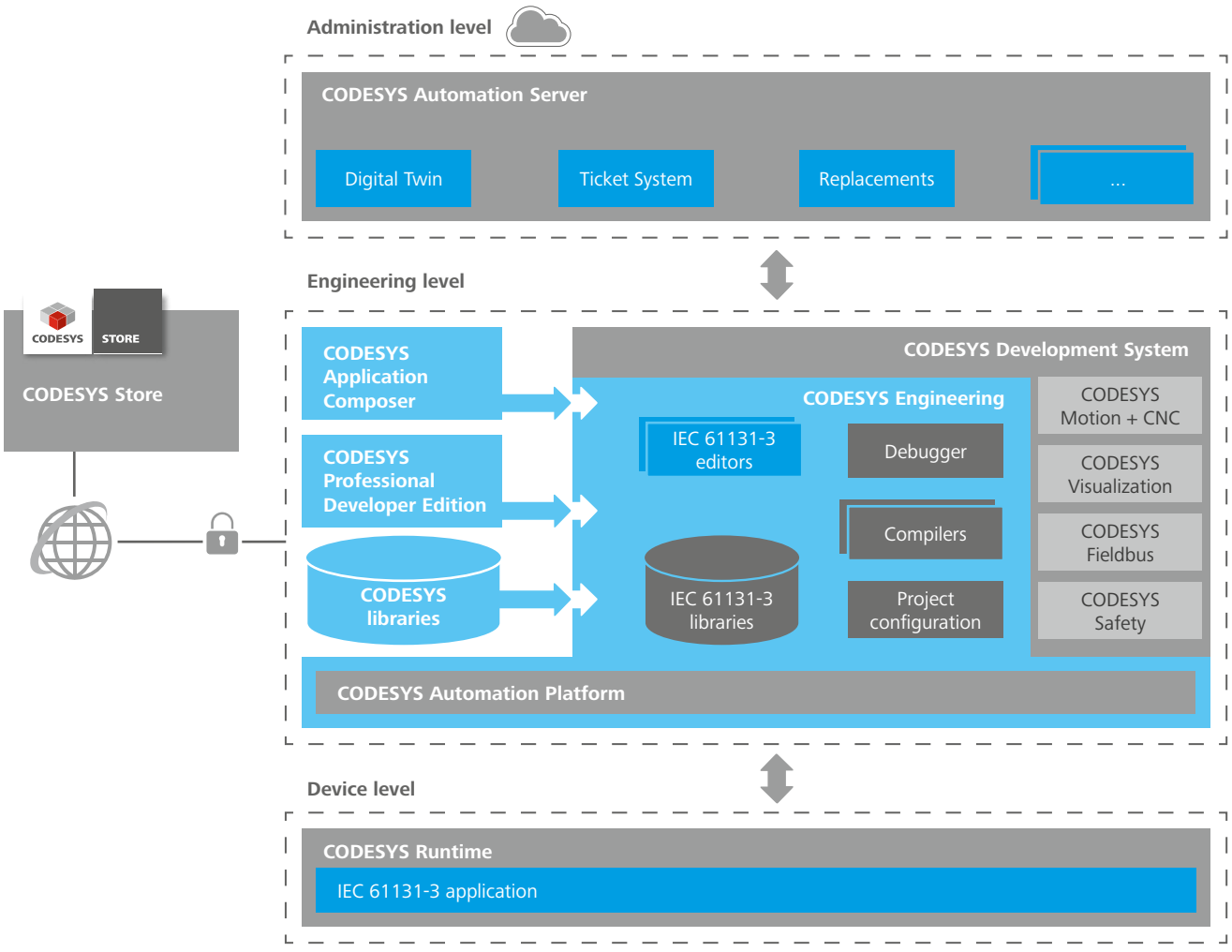
CODESYS is the leading software platform for IEC 61131-3 compliant project engineering. The development system combines classic programming of controller applications with the capabilities of professional software development for automation devices in the environment of Industry 4.0/IIoT (Industrial Internet of Things).

As a cloud-based Industry 4.0 platform, the CODESYS Automation Server adds a convenient management level to the system.

Over 400 controller manufacturers rely on CODESYS, in addition to about 100,000 end users from a wide variety of industries: factory, mobile, energy, embedded, process, and building automation. This makes CODESYS the most commonly used manufacturer-independent development environment employed around the world in millions of machines and plants.

All components for engineering automation applications are integrated directly in CODESYS, including editors for all IEC 61131-3 compliant implementation languages, compilers for native machine code, a powerful debugger, and a clear project configuration. Add-ons can further supplement these components for efficient application development.
The engineering platform is the basis for additional CODESYS product families, such as visualization, motion control, fieldbus configuration, and safety programming.

Engineering with CODESYS product landscape



The CODESYS Development System is an extendable development platform for industrial applications in automation technology.

CODESYS for device manufacturers and end users

Device manufacturers employ CODESYS to offer various types of programmable devices, and therefore complete automation systems for end users. With the CODESYS Automation Platform, device manufacturers can include libraries, application templates, or their own components to customize the CODESYS Development System for a specific device or application.

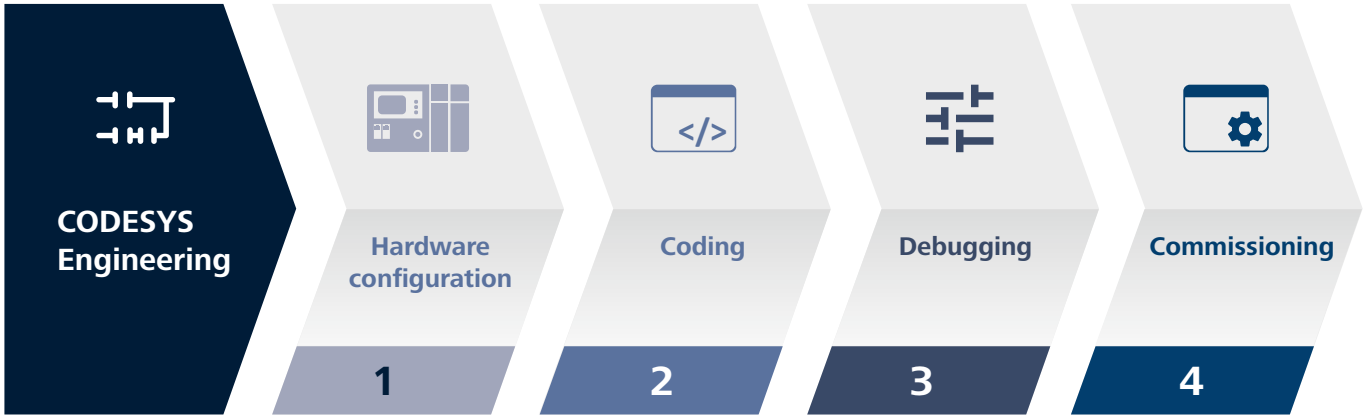
End users employ the CODESYS Development System and optional add-ons to develop and optimize applications. Benefits include extensive functionality, large-scale integration, uniform user interface, and the tool´s adaptability to specific requirements.

Future-proof investments with CODESYS products

Expert developers at the CODESYS Group work every day to enhance engineering with CODESYS. Benefits for device manufacturers and end users include:

1. Patches, service packs, and product versions in regular intervals available for download
2. An ever-growing range of functions and trend-setting innovations
3. Quality tested by our own test department
4. Open interfaces for linking to almost any infrastructure all the way to cloud servers

CODESYS is your trusted partner through the development process



Typical application programming passes through different phases. The CODESYS Development System supports users all the way from configuration to commissioning. The optional add-on tools from the CODESYS Professional Developer Edition are perfect for systematically supported software development.

CODESYS Development System

The goal of the IEC 61131-3 standard is practice-oriented and standardized application programming for users from all industrial sectors. As the market-leading implementation of this standard, the CODESYS Development System simultaneously integrates comprehensive possibilities for high-level language programming. Many functions support users of different programming levels in all development phases:

- Project tree for structuring project configuration, for example to divide the entire application into objects and tasks
- Configurator for integrating and describing various devices and fieldbus systems
- Editors for typical application development in all graphical and text-based implementation languages defined by the IEC 61131-3
- Functions for continued project engineering, such as linking of existing C code, integrated 3D visualization, or interfaces to other software systems
- Compilers generating lean and powerful machine code
- Debugger, simulator, and SoftPLC (as trial target system) for direct user testing of the created applications

Features of the development environment

- Support for creating structured and efficient applications – all-in-one tool from configuration to commissioning
- Optional object-oriented programming according to IEC 61131-3 (3rd edition), also combined with functional programming within the project
- Tried and tested library design with documentation capability – integrated directly in the development environment
- Multi-platform development and application reusability thanks to exchangeable target system descriptions for all CODESYS-compatible devices
- Versatile extensibility thanks to a modular design and available add-ons
- Well-structured user interface and customizable windows
- The CODESYS Development System is offered free of charge in the CODESYS Store (codesys.store)

Programming with integrated editors according to IEC 61131-3

CODESYS editors promote convenient programming:

- Context-sensitive menus and help pages – even for library content
- Automatic input completion and assistance, such as Intellisense, Auto Complete
- Automatic syntax check and visual highlighting of input errors
- Color-coded syntax highlighting, for example keywords and connected brackets
- Progressive zoom function, screen magnifier, and navigation in graphical editors

Configurators

Input of configuration data for project parameters, as well as parameters for integrated devices and fieldbuses, directly within the development environment

Special feature: Integrated generic and specific I/O configuration of fieldbuses, including symbolic assignment of I/O channels

Function Block Diagram (FBD)

Graphical editor for programming networks using operators and standard / customized POUs

Special feature: Special POU for direct calling of ST functions; customizable display of networks with line breaks and POU icons

Continuous Function Chart (CFC)

Graphical FBD editor with unrestricted layout of POUs and connections, including feedback paths

Special feature: Autorouting of connections between POUs, unrestricted definition and display of the execution order

Sequential Function Chart (SFC)

Graphical editor for programming sequential processes using steps and transitions

Special feature: Integrated diagnosis and control function with control flags and step monitoring by time

Structured Text (ST)

Text editor for structured programming in a high-level programming language

Special feature: Quick editing with the help of typical functions, such as grouping, collapsible tree structure, indented brackets, automatic indentation, and completion of commands

Ladder Diagram (LD)

Graphical editor for logical programming with contacts and coils – used internationally

Special feature: Calling of any POU; setting of negations, edge detections, and enabling inputs; special POU for direct calling of ST functions

Visualization

Unrestricted design of graphical user interfaces, for example for test purposes when programming and commissioning

Special Feature: Intuitive animation and more sophisticated displays by means of full access to all variables; responsive design

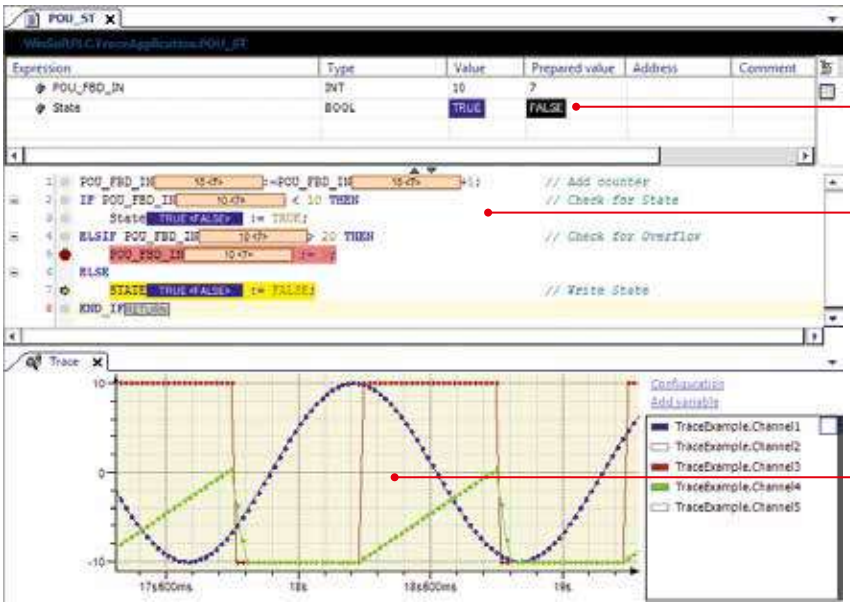
Furthermore, a set of additional editors is provided, for example for recipe management, trace recording, configuration of exported symbolic variables, or editing of applications in instruction lists (IL).

Tasks and features of the compiler

- Testing and display of compilation errors at the moment of input
- Compilation of application code into powerful native machine code for the CPU on the target system. CODESYS supports almost every CPU family for industrial applications.
- Analysis of the application and display of errors, warnings, and messages in a message window
- Direct navigation to each of the referenced program lines via message window
- Direct transfer of the application to the controller at the time of login
- Creation and transfer of an executable boot application for autonomous controller startup

Tasks and features of the debugger

- Display of application data at runtime in simulation mode on SoftPLC and discrete controllers
- Reading, writing, and forced setting of variable values, directly in the respective editor
- Monitoring of specifically selected values in watchlists
- Execution of code in single steps and complete single cycles
- Setting of conditional and absolute breakpoints and execution points
- Cyclical recording of variable values (sampling trace) on the target system and display in the development environment
- Preparation of special variables and data records for commissioning (recipes)
- Display of the execution order of code (flow control)
- Core dump for saving the complete PLC status to track error causes offline



List view of application variables

Online display of variable values with set breakpoint

Display of variable value history by time (sampling trace)

CODESYS Security

CODESYS provides numerous options for protecting applications and expertise. This is essential, especially for use in Industry 4.0/IIoT environments.

Security settings in the application project

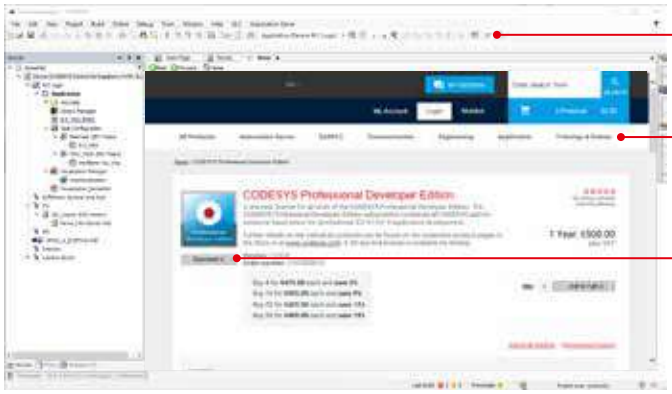
- Integrated encryption of project data and libraries with X.509 certificates, the CODESYS Key (USB dongle) or passwordt
- Protection of individual POUs by means of project-specific user management

Security options on the target device

- Individually defined user profiles for access protection of the application, controller, and visualization
- Operating modes to secure commissioning and operation during production
- Encryption and signing of communication with the running application, as well as the boot application (with X.509 certificates or unique dongle)
- Unlocking of optional controller functionality, such as calibration or service functions via license detection

Extensions available in the integrated CODESYS Store

The CODESYS Store is an online shop offering CODESYS extensions, such as the products included in the CODESYS Professional Developer Edition. End users can access the store directly from the CODESYS Development System or from a standard browser to download and install add-ons.
Every installed add-on package is listed in the integrated package manager including version, licensing status, and available updates. Device manufacturers and end users can easily offer their own extensions, examples, and snippets in the CODESYS Store to thousands of end users.



Direct menu access

Navigation via integrated Store browser

Convenient integration of Store products via direct download

CODESYS Store – All software products available in one place

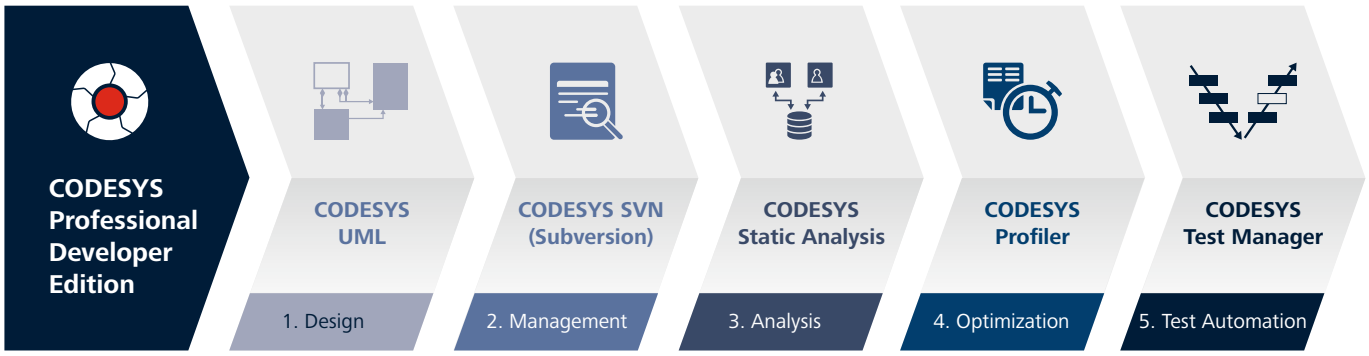
At codesys.store, users can download all listed products (both free of charge and fee required) and install the extensions directly into the CODESYS Development System.
All that is needed is a one-time registration. Users can license fee-required products quickly and easily without having to leave the CODESYS Store.

The CODESYS Store is open for add-on products from third-party vendors.

CODESYS Professional Developer Edition

Software developers in IT programming have access to sophisticated add-on tools for development support. The CODESYS Professional Developer Edition offers controller programmers the same convenience. The integrated tools help optimize the coding phase and increase the performance and quality of applications.

The CODESYS Professional Developer Edition is available in the CODESYS Store for users of the CODESYS Development System.



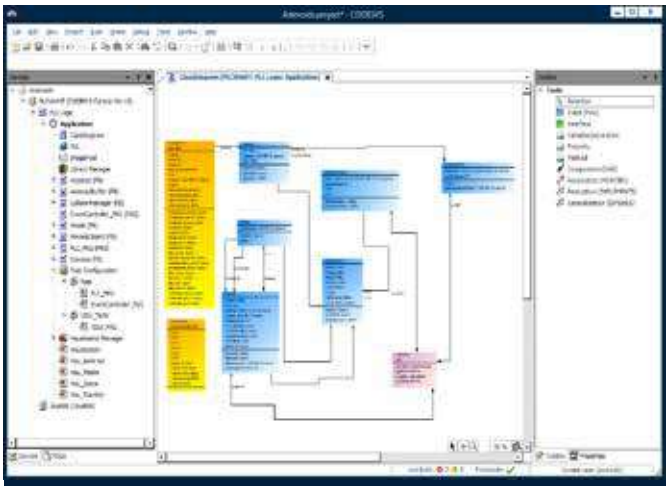
Supporting add-on tools for the coding phase

CODESYS UML: Model-based application development

UML (Unified Modeling Language) increases the legibility and overview of the project by providing a common basis for technologists and software developers.

The following visuals are supported:

- Class diagram: Design and display of object-oriented project structures in a graphical editor with bidirectional code conversion
- State chart: Additional graphical implementation language with a direct link to the code generator



Application description in the class diagram

CODESYS Profiler: Dynamic runtime analysis of the application

With CODESYS Profiler, end users can measure the runtime performance of individual IEC 61131-3 program blocks. Based on individual results, users are then able to optimize the source code.

Features:

- Verification of individual predefined portions of code or a complete cycle
- Well-structured display of the measured times in a call tree
- Display of the code coverage of the executed measurement
- Start and end of measurements at any time

CODESYS SVN: Management of the application project

CODESYS SVN is an interface to the version control system Apache™ Subversion® (SVN). End users can use this tool to manage independently both the complete IEC 61131-3 project version, as well as the individual application objects. Users benefit from automated source code management when developing a project in various teams or over a long period of time.

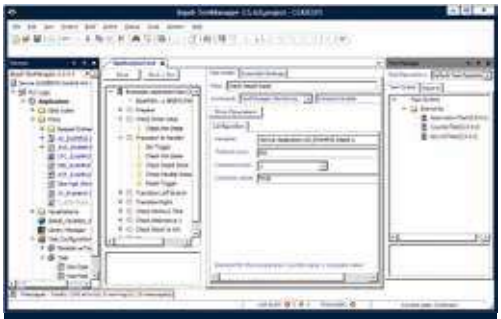
Features:

- Seamless operation integrated into CODESYS
- Version history and multi-user access to objects
- Compare function with change notification in all implementation editors
- Direct visual display of the object status in SVN
- Merging of simultaneous changes to the same object

New: As of 2020, Git supported as additional version control system

CODESYS Test Manager: Automated application tests

The CODESYS Test Manager provides users with comprehensive functions for system tests, module tests, and regression tests. These functions enable the user to create, manage, and perform automated recurring tests for quality assurance before commissioning and when releasing an IEC 61131-3 controller application.



Integrated configuration and management of test scripts

Features:

- Generation of test cases with dialogs as a unit test directly in IEC 61131-3 or in test tables
- Central storage and management of test scripts and test reports, for example for different projects
- Efficient performance of recurring tests with automated generation of test reports
- Test reports in HTML format for viewing and in XML format for automated evaluation

CODESYS Static Analysis: Identification of potential application errors

Source code is tested based on defined rules and threshold values, in addition to the syntax check in the compiler. End user benefits: The source code can be improved by early recognition of logical and formal program errors. In addition, end users are relieved of performing syntax checks, which are now automated and reproducible, for example by applying the integrated coding guidelines.

Features:

- Many analysis rules, some of which can be parameterized or combined with individual rule sets
- Integrated testing of coding guidelines and naming conventions
- Numerous metrics for evaluating code

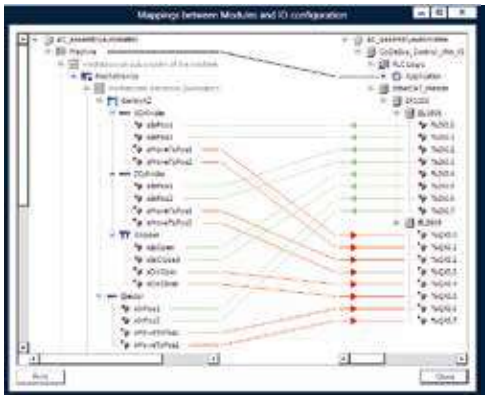
Central display of contents for static code analysis

CODESYS Application Composer

The CODESYS Application Composer is a development tool for efficiently creating application variants consisting of recurring function blocks.

In this way, automation specialists can use the CODESYS Application Composer to engineer complete control systems from predefined modules.

This allows them to focus on the process flow and compose their machine applications. Then CODESYS generates the complete PLC program based on modules and their parameterization.

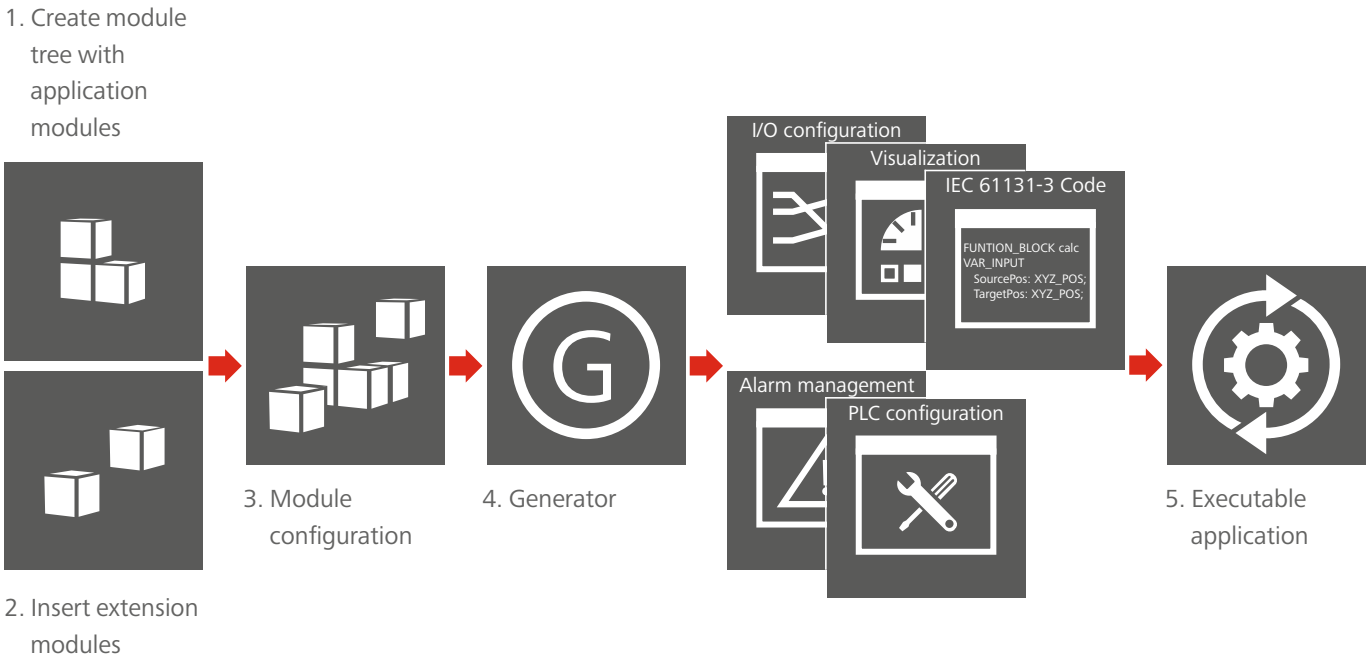


Example of a module tree

Typical application fields for the CODESYS Application Composer

- Engineering of serial machine variants, equipped and installed according to specific customer requirements, directly from the sales process
- Generation of applications for complete systems and special purpose machines that are constructed from similar basic modules

Easy and automatic composition of complete control applications



CODESYS Automation Platform

The CODESYS Automation Platform is a development platform allowing for the individual extension of the CODESYS Development System.

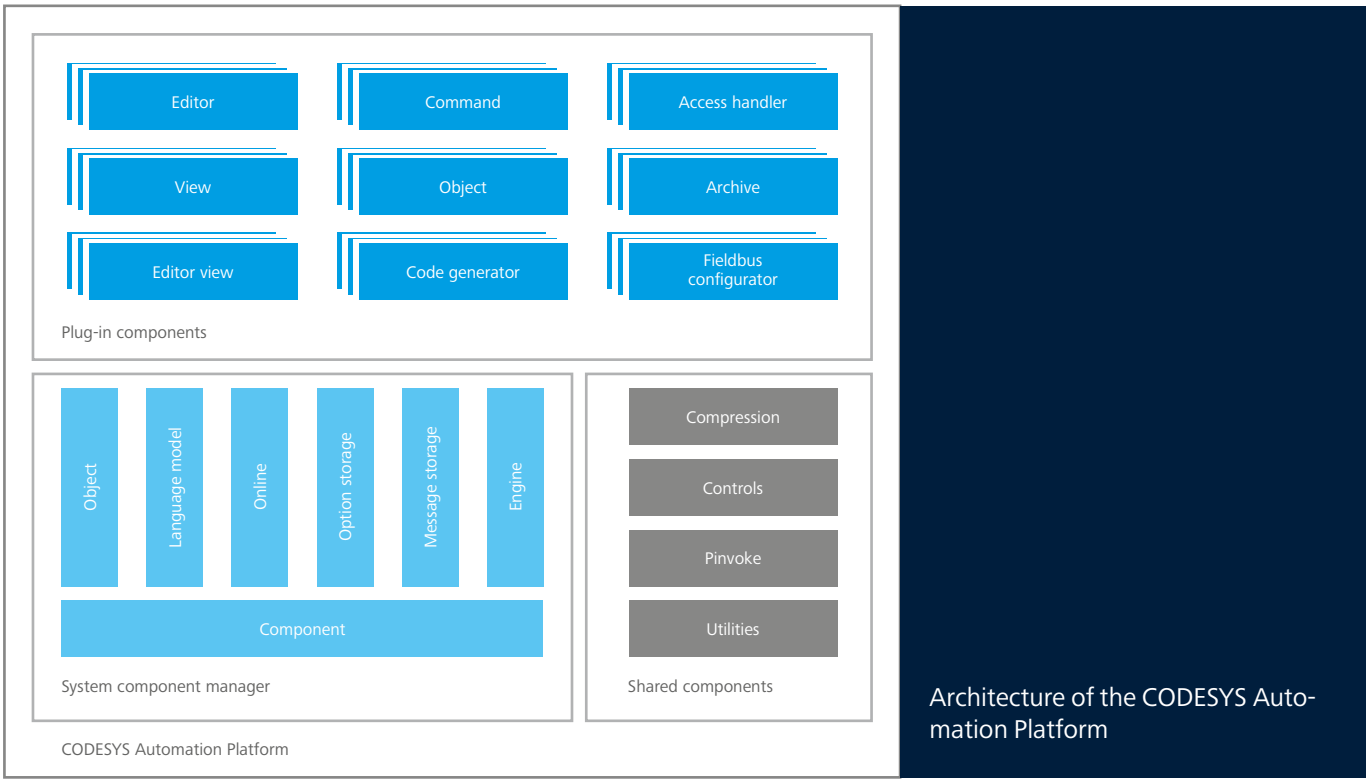
The CODESYS Group has been using this platform for years to develop both the CODESYS Development System and available extensions. At the same time, numerous device manufacturers use the CODESYS Automation Platform for their own extensions.

The CODESYS Automation Platform is sold as a comprehensive toolkit with development support and can be purchased exclusively from the sales department at the CODESYS Group.

Functionality of the CODESYS Automation Platform

Extensive access and design capabilities:

- Project database for programmatic access toCODESYS objects
- Compiler interface with code generators for the creation of symbol tables, cross references, parse trees, and machine code
- Online components for extensible communication with the CODESYS Runtime System
- Administration of different plug-ins in any version (installation, deinstallation)
- Numerous easy-to-use service classes, for example for forward and backward-compatible serialization of database objects
- Access to the global settings of CODESYS applications



Architecture of the CODESYS Automation Platform

Typical examples of the CODESYS Automation Platform

- Customized functions, such as views, dialogs, wizards, and implementation languages
- Add-on functions, such as configurators and interfaces for existing software
- Implementation of individual stand-alone software, such as project documentation, automated generation of source code, or commissioning of controllers without a development environment
- Labeling of the development system, for example name, logo, and range of functions

Members of the CODESYS Group

CODESYS GmbH
Memminger Str. 151
87439 Kempten, Germany

Tel.: +49-831-54031-0
info@codesys.com

codesys.com

CODESYS Italia Srl
Milan, Italy

CODESYS Corporation
Beverly, Massachusetts, USA

CODESYS Software System (Beijing) Co., Ltd.
Beijing, P.R. China

11/2019

CODESYS – the manufacturer-independent IEC 61131-3 automation software.

CODESYS Product Families:

Note: Not all CODESYS features are available in all territories. For more information on geographic restrictions, please contact sales@codesys.com.

CODESYS Group | We *software* Automation.

English

CODESYS® Motion CNC Robotics

Logic and motion control integrated in one IEC 61131-3 system: Development kit for convenient engineering of motion, CNC and robot applications

CODESYS Motion CNC Robotics

CODESYS is the established market standard for programming IEC 61131-3 compliant industrial controllers. Thousands of different standard and special-purpose machines for manufacturing engineering are automated with CODESYS, as well as other industrially controlled applications in a wide range of different industries. At the same time, the tool has all the essential technologies for use in Industry 4.0 environments. They make the CODESYS Automation Server a convenient, cloud-based administration platform for PLCs, motion controllers, CNC and robot controllers.

Numerous machines and plants require a versatile controller for motion sequences in addition to the logic program. Thanks to the high performance of modern processor platforms, motion control, CNC, and robotics tasks can be processed on the same devices as the logic control. With the open architecture of CODESYS, it is possible to link and even integrate external engineering tools for motion planning and control.

CODESYS Motion CNC Robotics makes it easier.
Manufacturers of automation devices can integrate CODESYS SoftMotion and CODESYS SoftMotion CNC+Robotics into the CODESYS platform. In this way, the logic controller takes on the role of a motion controller with all of the required components, such as motion editors, kinematic transformations, standardized function blocks for robotics functions, and the CNC kernel.

Application developers benefit in two ways.
Only a single hardware device is required for logic and motion control, and both application components can be engineered with one and the same development system. The consistent operating structure makes the engineering of motion tasks significantly easier and more flexible as compared to conventional systems.

CODESYS Motion CNC Robotics

From single-axis motion to multi-dimensional CNC path interpolation and robot control – with CODESYS Motion CNC Robotics, users can implement various motion control tasks for the logic controller in the familiar development interface.

Motion CNC Robotics provides motion functionality in the form of a development kit in the PLC development system. This can be used for resolving any complex task with the IEC 61131-3 language tools.

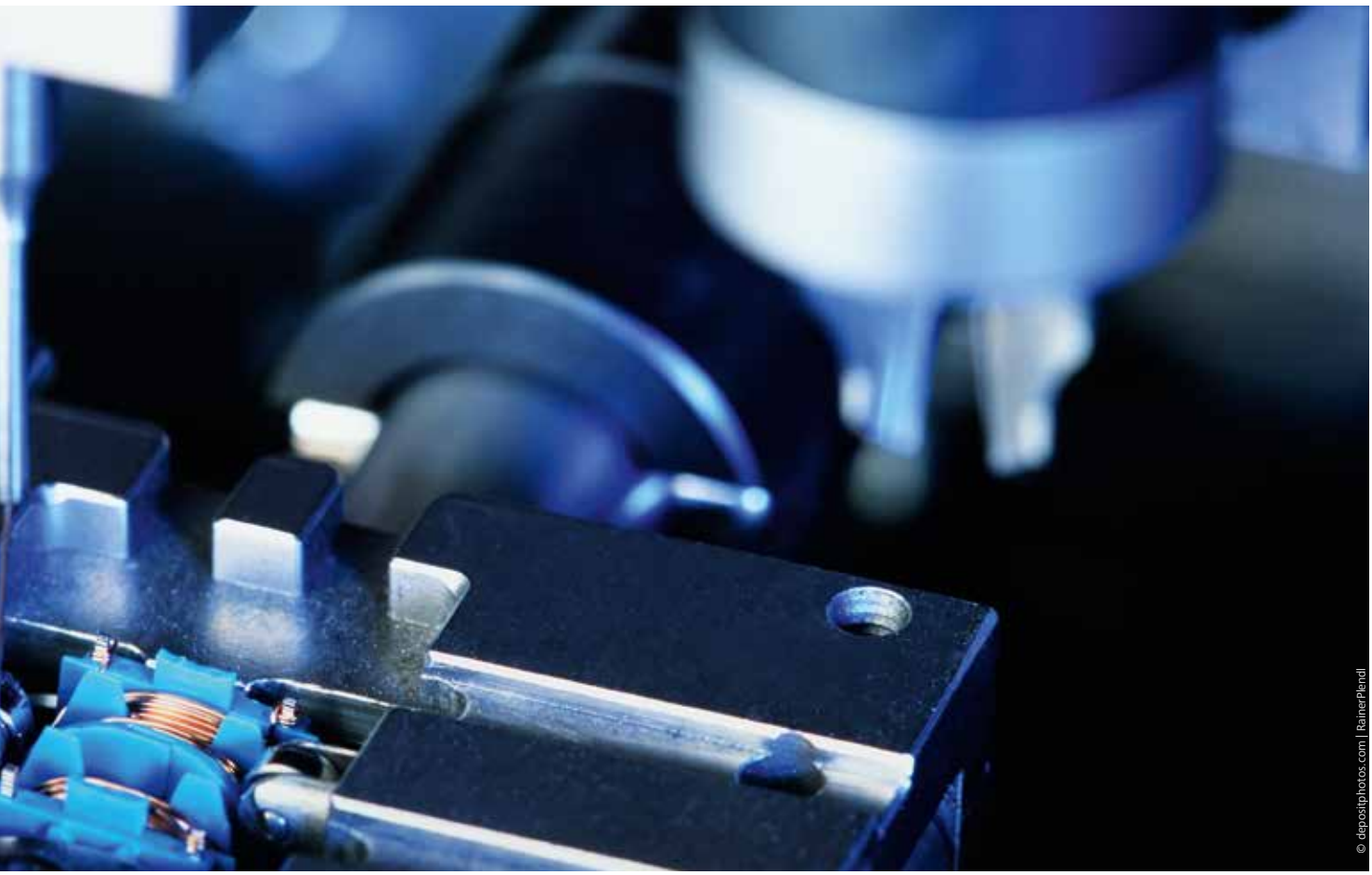
Ideal platform for motion control – from an experienced partner

CODESYS provides all core properties for Motion CNC Robotics:

- Integrated library design ⇨ Dynamic, easy integration of motion functions as library POUs, specific to each individual application
- Integrated compilers for various processor platforms ⇨ Cross-system deployment of products without any need for customization
- Integrated fieldbus support ⇨ Configuration of the employed drives and I/O components
- Motion engineering abstracted from drive and bus systems and based on the IEC 61131-3 data structure ⇨ Ideal for simulation, testing, commissioning, and machine refitting
- Easy integration of additional configuration and planning tools from the device manufacturer thanks to plug-ins, e.g. for motion editors or specific drives ⇨ Full integration of all engineering components
- Integrated visualization facilitates simulation, testing, and commissioning ⇨ No additional components required
- Easy integration of additional programming and configuration tools for SafeMotion functions with EtherCAT safety modules (EL6900, EL6910, EK1960)

The CODESYS Group is an experienced motion partner.

The makers of CODESYS have over 20 years of experience in software development for coordinated motion control. Expert motion specialists from the departments of product management, development, testing, support, and training pass on their knowledge and experience to customers.



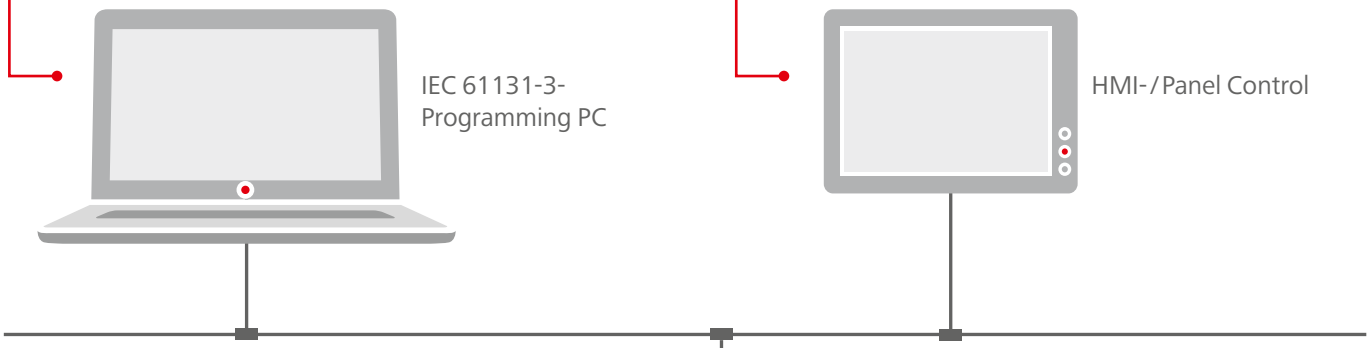
Overview on CODESYS Motion CNC Robotics

CODESYS Development System

- Programming the logic controller (IEC 61131-3)
- Motion planning with graphical editors
- Motion control using IEC 61131-3 function blocks
- Engineering of optional machine visualization and diagnostics
- Optional: Configuration of individual safety functions for applications with SafeMotion or safe drive/axis monitoring with EtherCAT Safety modules (EL6910, EK1960). Prerequisite: Integration of CODESYS Safety

CODESYS Visualization (optional)

- Commissioning functions
- Machine visualization
- CNC operation
- Diagnostics

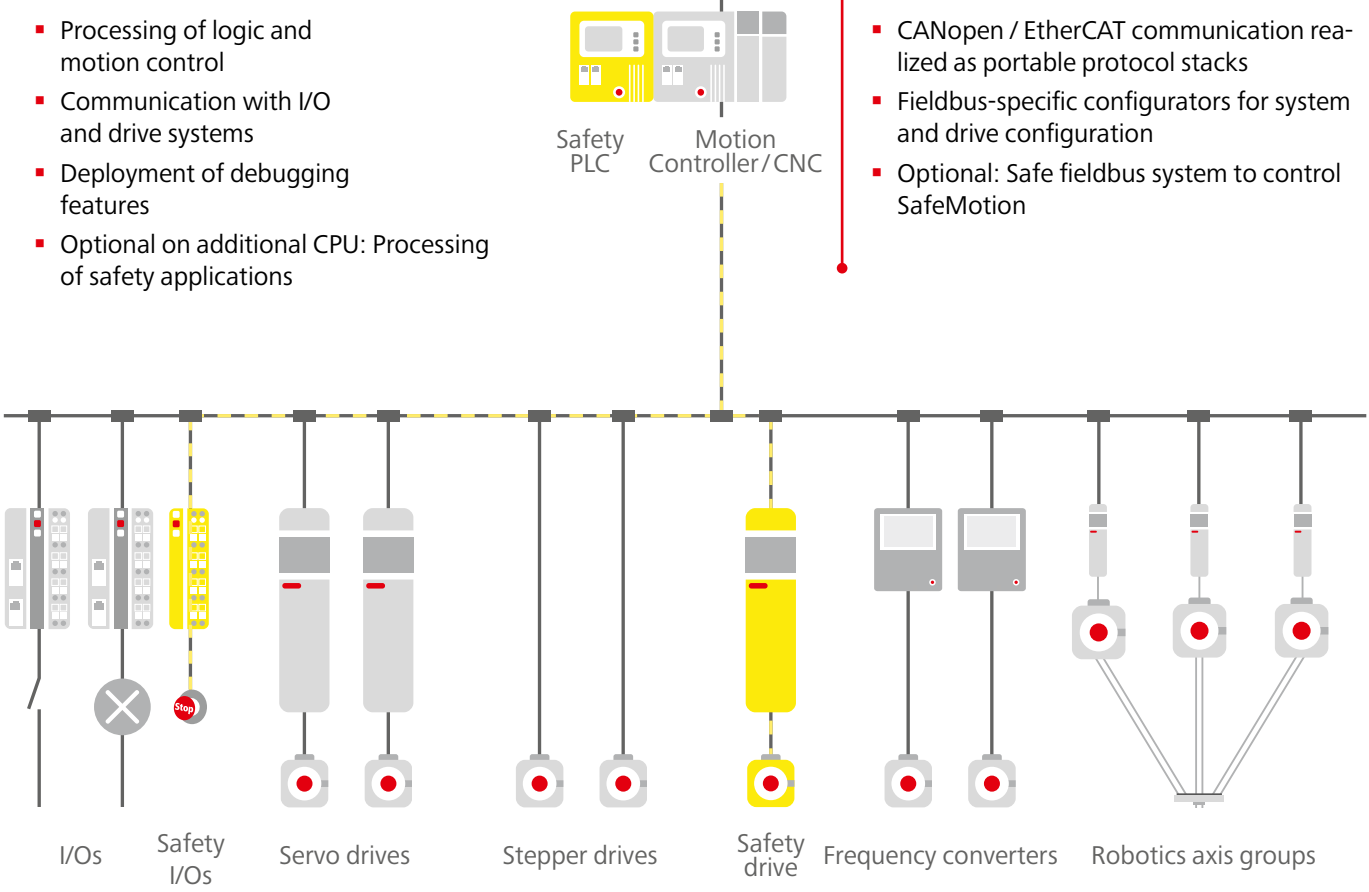


CODESYS Runtime

- Processing of logic and motion control
- Communication with I/O and drive systems
- Deployment of debugging features
- Optional on additional CPU: Processing of safety applications

CODESYS Fieldbus

- CANopen / EtherCAT communication realized as portable protocol stacks
- Fieldbus-specific configurators for system and drive configuration
- Optional: Safe fieldbus system to control SafeMotion



Available control methods

For servo drives and robotic axis groups

- Motion controller delivers trajectory bases to servo drive in cycles
- Positional control by servo drive

For stepper drives

- Control of the stepper drives via pulse/direction interface by the motion controller
- Position feedback through pulse counter
- Position control in the motion controller

For frequency converters

- Definition of the target speed of the frequency inverter by the motion controller
- Position indication by sensors, e.g. rotary encoders
- Position control in the motion controller

For safety servo drives

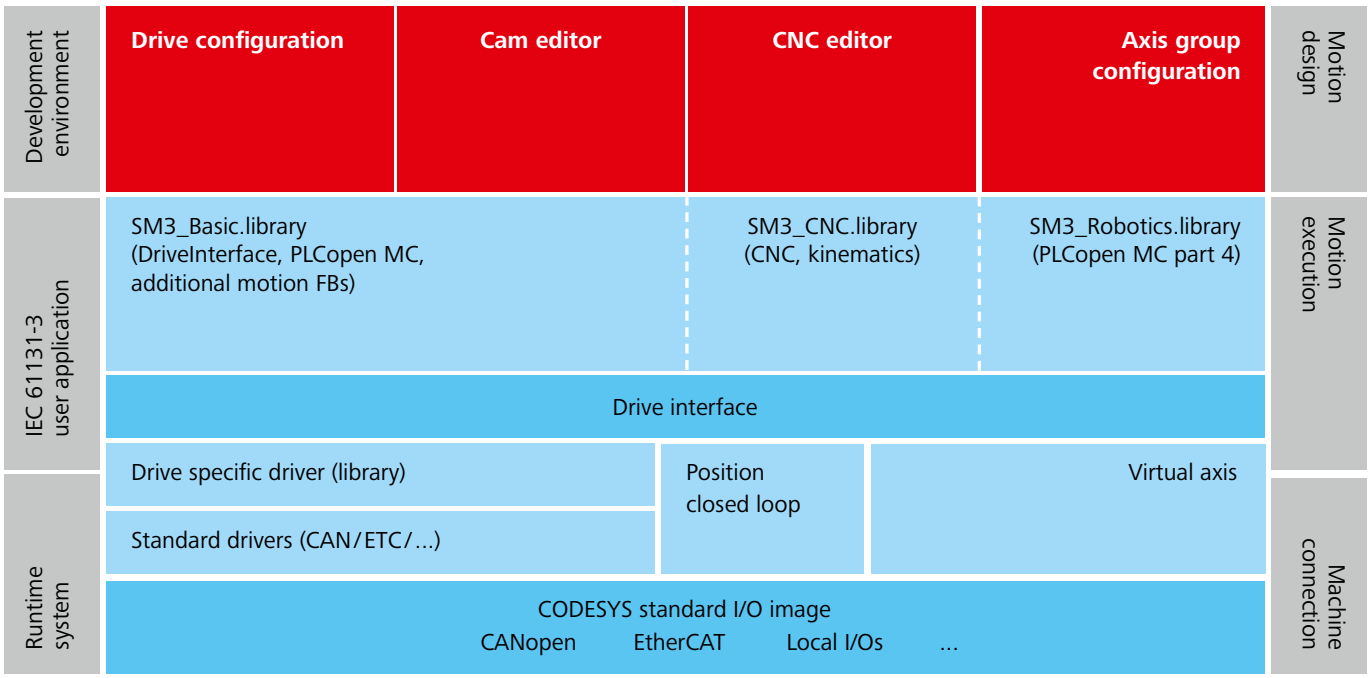
- Motion controller delivers target points and constraints for the axis dynamics to the axis group servo drive
- Drive control by servo drive

Structure of CODESYS Motion CNC Robotics

CODESYS Motion + CNC is seamlessly integrated into the CODESYS Development System as a development kit and thus benefits from the available functions of the platform. Movement is processed in the controller within the context of CODESYS Control (IEC 61131-3 runtime system).

Components included in the development kit:

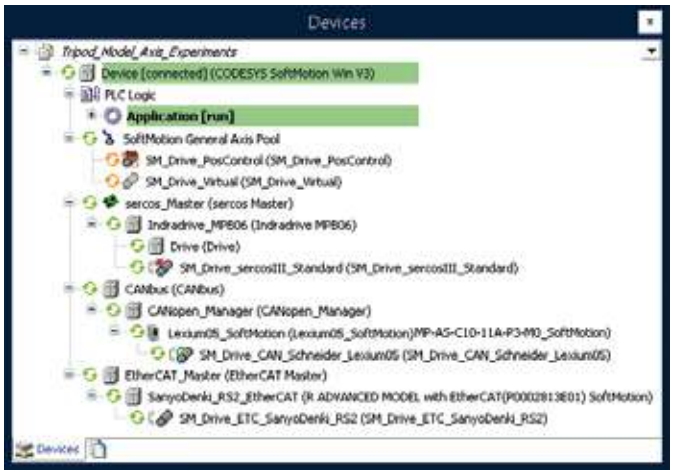
- Editors/configurators for motion planning (cams, CNC, robotics axis groups)
- Extensive library with device independent POUs , realized in the IEC 61131-3 languages for implementing motion and for help functions
- Corresponding visualization templates for simplified engineering and commissioning
- Support for the most widely used fieldbus systems
- Generic CiA 402 and special drivers for the most popular servo drives, e.g. from Schneider Electric Automation GmbH, KEB Karl E. Brinkmann GmbH, Bosch Rexroth AG, Control Techniques Ltd., Festo AG & Co. KG, and STÖBER ANTRIEBSTECHNIK GmbH & Co. KG (complete list at codesys.com/motion).
- Samples and documentation for creating motion applications



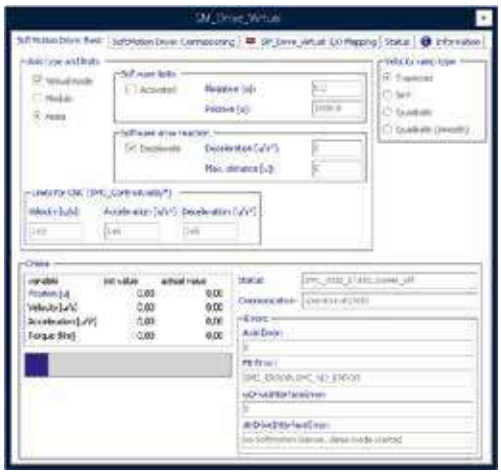
Using CODESYS Motion CNC Robotics

Configuration and commissioning of drives

- Adding the necessary bus system to the CODESYS project: support of CANopen, EtherCAT, as well as standard systems, such as stepper drives and drives with analog control; more upon request
- Adding and configuring the required drives
- The device name represents implicitly provided IEC data structure with (drive driver), allowing for a smooth exchange of drives and drive buses without changing the application code.
- Drive commissioning even without application available thanks to integrated "Online Config Mode"
- Configuration of the bus-specific and drive-specific parameters via the object directory of the devices



The fieldbus and I/O configurators integrated in CODESYS allow for a clear configuration of supported drives.



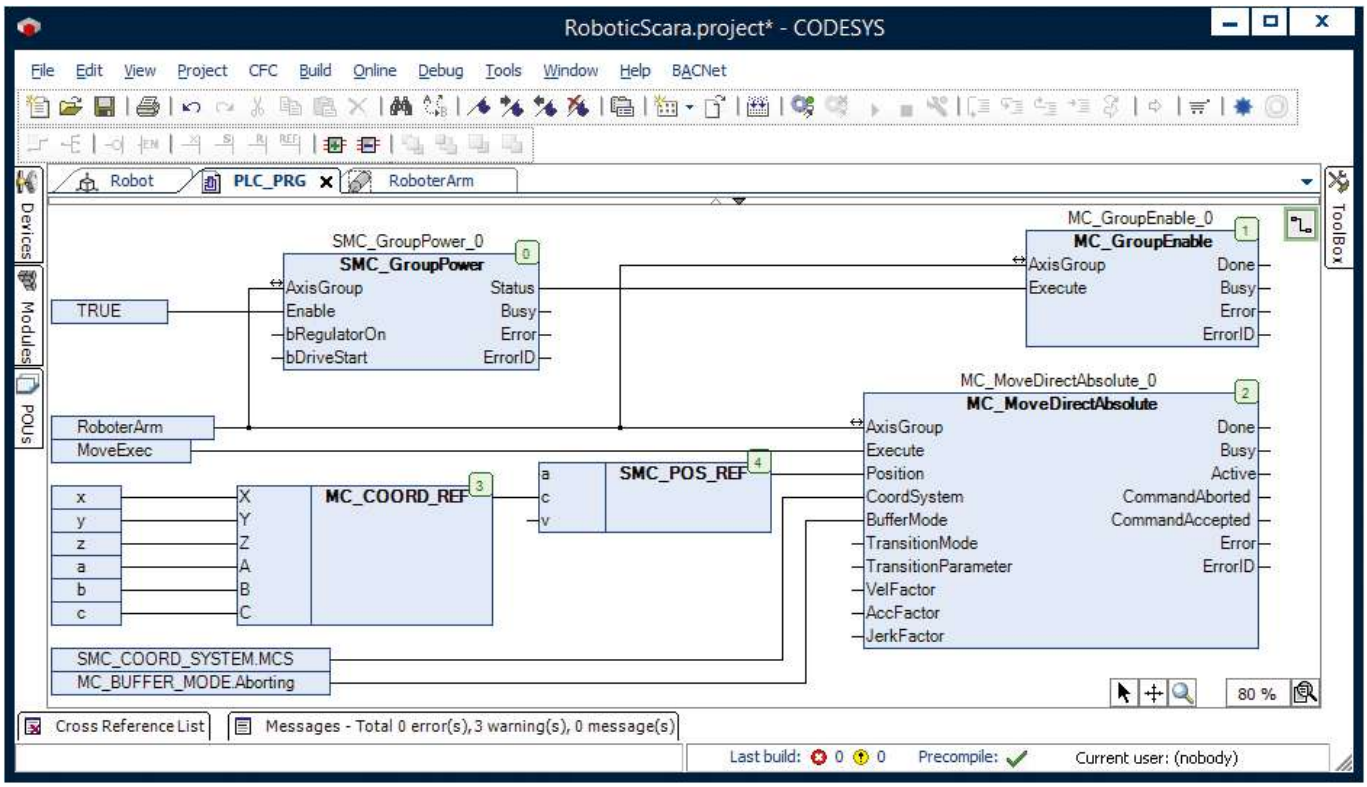
In online mode, the configurators provide valuable information, such as status, operating mode, and current parameter values.

Motion planning and execution

- Calling of POUs according to PLCopen for MotionControl for motion control in CODESYS projects (e.g. MC_Power, SMC_GroupPower, MC_MoveAbsolute, MC_MoveVelocity, and MC_MoveDirectAbsolute)
- Parameters of the POUs: IEC 61131-3 variables that can be changed during runtime of the application, value change e.g. by logic application, sensor data, or user input in the user interface
- Optional call of included add-on POUs (e.g. for diagnostics or error handling)
- Convenient motion planning of cams, CNC movements, and robotics axis groups with special editors/configurators. Information about CODESYS SoftMotion and CODESYS SoftMotion CNC+Robotics starting from page 8.

Commissioning of the motion application on the motion controller

- Compiling, downloading, and executing the application
- Additional tools:
  - Visualization templates for POUs allow for easy online operation and parameterization.
  - CODESYS Depictor objects allow for easy 3D visualization of motion in the CODESYS Development System by means of the actual control application.
- Commissioning of the motion application by means of the CODESYS Development System – The motion program runs as subtask of the controller.



Thanks to the function library for PLCopen for Motion Part 4, the programming of robot tasks is possible with just a few block calls.

Selected references for CODESYS Motion CNC Robotics

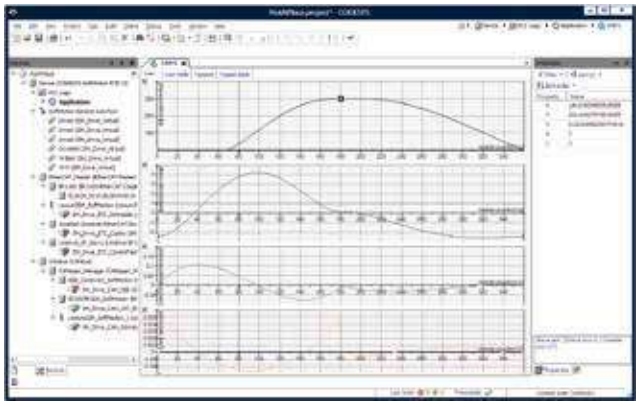
- ASYS Automatisierungssysteme GmbH
- Baumann GmbH
- Bosch Packaging Technology B.V.
- Delta Electronics Inc.
- Festo AG & Co. KG
- Grossenbacher Systeme AG
- KEBA AG
- KEB Karl E. Brinkmann GmbH
- Lenord, Bauer & Co. GmbH
- Kendrion Kuhnke Automation GmbH
- MITSUBISHI ELECTRIC EUROPE B.V.
- Parker Hannifin Manufacturing Germany GmbH & Co. KG
- ROFIN-BAASEL Lasertech GmbH & Co. KG
- Schneider Electric Automation GmbH
- STÖBER ANTRIEBSTECHNIK GmbH & Co. KG
- Trumpf-Laser GmbH + Co. KG

CODESYS Motion CNC Robotics – Available products

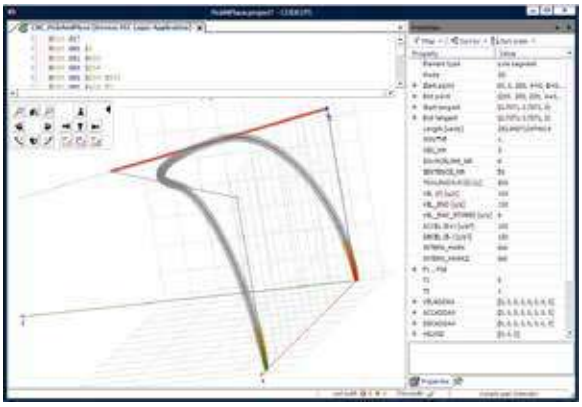
CODESYS SoftMotion:

For **single-axis and coordinated multiple-axis traversing motion** (e.g. master/slave functions or cams):

- Use of available library POUs and programming of motion functions
- Any interconnection of the function possible within the logic application
- Graphical planning of cam functions by means of integrated cam editor
- Numerous POU-specific visualization templates for easy commissioning with the CODESYS Development System
- Additional visualization templates for online editing of cams in runtime mode with the optional products CODESYS HMI, CODESYS TargetVisu, and CODESYS WebVisu



Motion planning with integrated cam editor in CODESYS SoftMotion



Convenient definition of CNC curves with integrated graphical 3D editor and associated G code (according to DIN 66025) in CODESYS SoftMotion CNC+Robotics

CODESYS SoftMotion CNC+Robotics:

Includes the complete functionality of CODESYS SoftMotion, as well as additional functions for coordinated motion control.

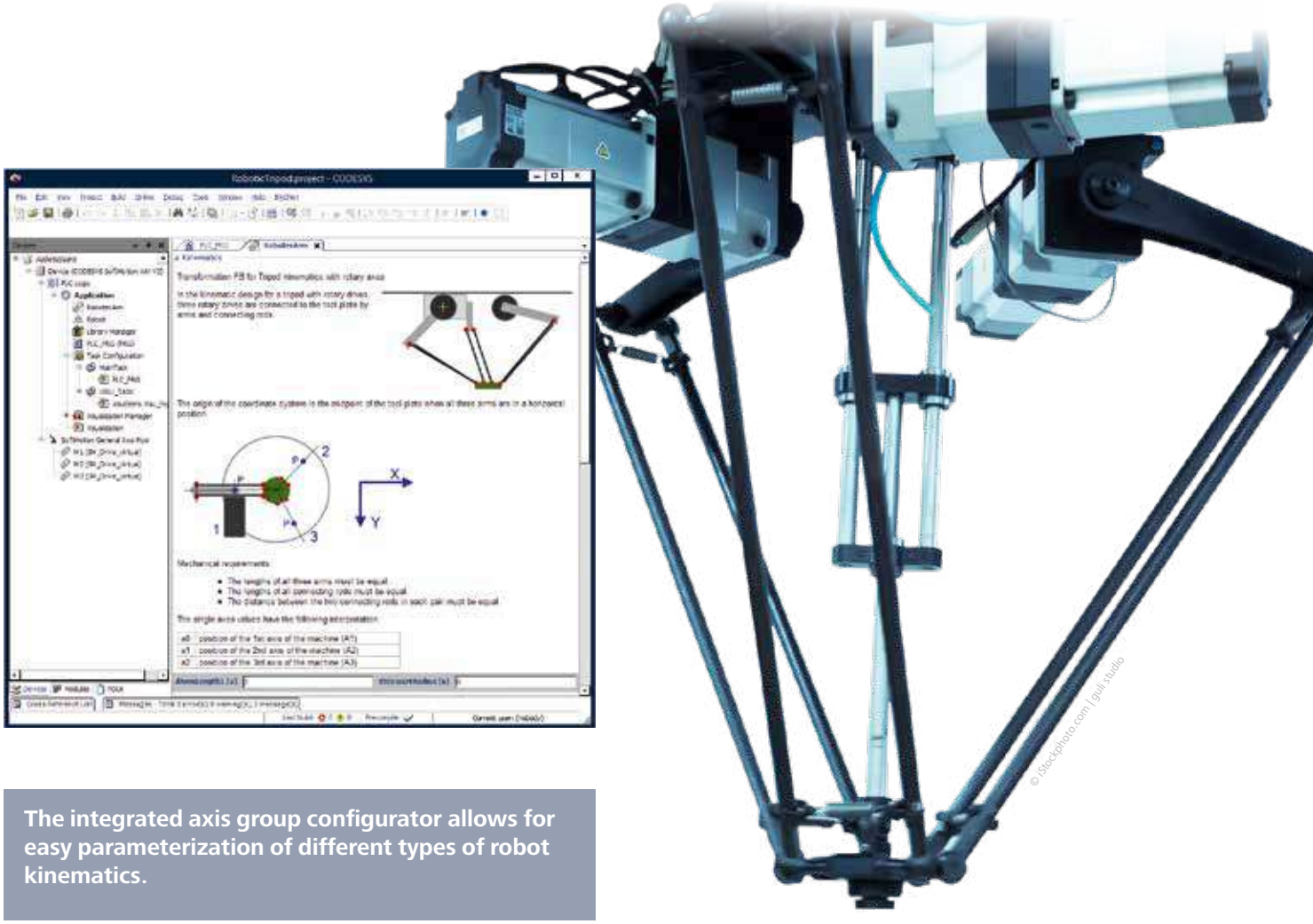
For **CNC motion** with multiple coordinated axes and precisely defined motion path:

- CNC motion planning in the integrated DIN 66025 editor with graphical 3D display
  - Step-by-step by means of an extensive set of G code motion commands e.g. line, circle, spline incl. subroutines and expressions
  - By data input in a tabular editor
  - Graphically in the 3D editor with numeric post-editing of the G code
  - By reading existing G code files in ASCII format
  - By importing DXF files for automated generation of matching G code
- Support of different speed profiles: Trapezoidal, sigmoidal, quadratic (jerk-limited, S profile)
- Definition of necessary path velocity (feed) and limits for acceleration, deceleration, and jerk
- POUs for limiting the dynamics of spatial and additional axes
- Processing of CNC motion by POUs
- Numerous additional functions, such as tool radius compensation, edge smoothing, and limited curve velocity ▸

- Creation of customized POUs by means of IEC 61131-3 for own functions (e.g. application-specific angle rounding for laser cutting)
- Decoder and interpolator as portable IEC 61131-3 library POUs
- Numerous kinematic transformations for different task areas (e.g. portal / gantry systems and robots)
- Visualization templates for online editing of CNC projects in runtime mode, as well as for diagnostics and testing of kinematics with optional products (e.g. CODESYS HMI, CODESYS TargetVisu, and CODESYS WebVisu)

For robotics applications with PTP (point-to-point) or CP (continuous path) interpolation:

- Parameterization of axis groups for predefined kinematics in a convenient configurator
- Integrated motion planning with coordinate values for robot positions in different coordinate systems
- Function library with program blocks according to PLCopen for MotionControl Part 4, such as SMC_GroupPower, MC_GroupEnable/Disable/Reset/ReadError, MC_MoveDirectAbsolute, MC_MoveLinearAbsoulte, MC_MoveCircularAbsolute, MC_GroupHalt, MC_GroupStop, MC_TrackConveyorBelt, and MC_TrackRotaryTable
- Numerous supported kinematics with convenient configuration, for example various gantry robots (2 / 3 / 5 axes), bipod / tripod robots, and SCARA robots
- Additional orientation kinematics



The integrated axis group configurator allows for easy parameterization of different types of robot kinematics.

CODESYS Motion CNC Robotics – Turning intelligent devices into motion controllers, CNC or robotic controllers

For users and device manufacturers

Systems based on standard device platforms:

- PC-based systems with Windows/Linux
- Powerful Linux platforms such as emPC-A/iMX6, PLCnext or embedded PCs CX

Requirements

- Suitable industrial PC with Microsoft Windows 10 / Linux incl. real-time extension
- Fieldbus interface for drive actuation (CAN) or available Ethernet port (EtherCAT)

SoftPLC with optional motion control extension in the CODESYS Store and installation on the target device

- For Windows IPCs: CODESYS Control RTE SL with its own real-time extension
- For Linux PCs: CODESYS Control for Linux SL
- For high-performance Linux platforms
- Motion control products (see p. 8) available as optional extensions
- License purchase and individual licensing via software / USB dongle per device

Options: Additional licenses for

- CODESYS TargetVisu: Visualization on the device (integrated / connected display)
- CODESYS WebVisu: Monitoring / diagnosis via HTML5 web browser

For manufacturers of intelligent automation devices

Motion controllers, CNC or robotic controllers – also integrated in mechatronic controllers and intelligent drives

Requirements

- Real-time capable system
- Hardware with appropriate performance resources depending on planned use
- FPU recommended
- Appropriate communication links to drives and standard fieldbuses (CANopen, EtherCAT)

Business model

- Purchase of the CODESYS Control Runtime Toolkit
- Implementation of the runtime system with the options CODESYS SoftMotion or CODESYS SoftMotion CNC+Robotics incl. complete motion kit for distributing the device to the end users
- Optional purchase of the relevant fieldbus support
- Purchase of runtime licenses for CODESYS SoftMotion or CODESYS SoftMotion CNC+Robotics for each delivered device; price dependent on quantity and device platform

High-performance manufacturing machine for loading and completion of industrial filter systems – automated by DOR Engineering on PC-based controllers with CODESYS Motion CNC Robotics

Typical use cases for CODESYS Motion CNC Robotics

CNC application
- Use of the CNC editor
- Jogging the axes with PLCopen blocks
- Gantry kinematics with stepper drives

Pick & Place application
- Use of PLCopen blocks for positioning (tool plate) and for belt-synchronous placement of an object on a moving target.
- Depiction of the process with visualization templates

Tripod robots and palletizing robots
- Robot kinematics (transformation and parameterization)
- 3D visualization with CODESYS Depictor in the CODESYS Development System
- Configuration of the axis group with the integrated configurator

Labeling/cam application
- Use of cam editor
- PLCopen POUs and virtual axis as master shaft
- Use of touch probe/latching function

Collaborative machine or robot applications
- Robot kinematics with communication via safety field bus or I/Os
- Safety logic application for safe control of robots or CNC movement

CODESYS Motion CNC Robotics – Benefits at a glance

- **Versatile motion planning:**
  - Motion control via status of the logic application and vice-versa, simple scaling of trajectories.
  - Control of trajectories and motion from the optional visualization
- **CNC and robotics programming regardless of the kinematics:**
  Change of kinematics by intuitively parameterizable objects in the device tree and library POUs.
- **Generic implementation of robotics applications** with axis group configurator and PLCopen for MotionControl Part 4 function blocks
- **No fixed restrictions:** Limitation of number of axes or update rate only by available computing power, employed fieldbus, and available memory
- **Motion programming regardless of drive:** Change of drives without a software change
- **Portable to different platforms:**
  - Libraries and application created in IEC 61131-3 languages
  - CODESYS compiles motion program for the respective target system
- **Integration in the CODESYS Development System:**
  - One hardware and interface for logic application, motion application, and visualization
  - Consistent engineering as well as cost-efficient implementation
- **Easy connection to Industry 4.0 environments with integrated functions/properties all the way to cloud-based device administration**

Members of the CODESYS Group

CODESYS GmbH
Memminger Str. 151
87439 Kempten, Germany

Tel.: +49-831-54031-0
info@codesys.com

codesys.com

CODESYS Italia Srl
Milan, Italy

CODESYS Corporation
Beverly, Massachusetts, USA

CODESYS Software System (Beijing) Co., Ltd.
Beijing, P.R. China

11/2020

CODESYS – the manufacturer-independent IEC 61131-3 automation software.

CODESYS Product Families:

CODESYS Group | We *software* Automation.